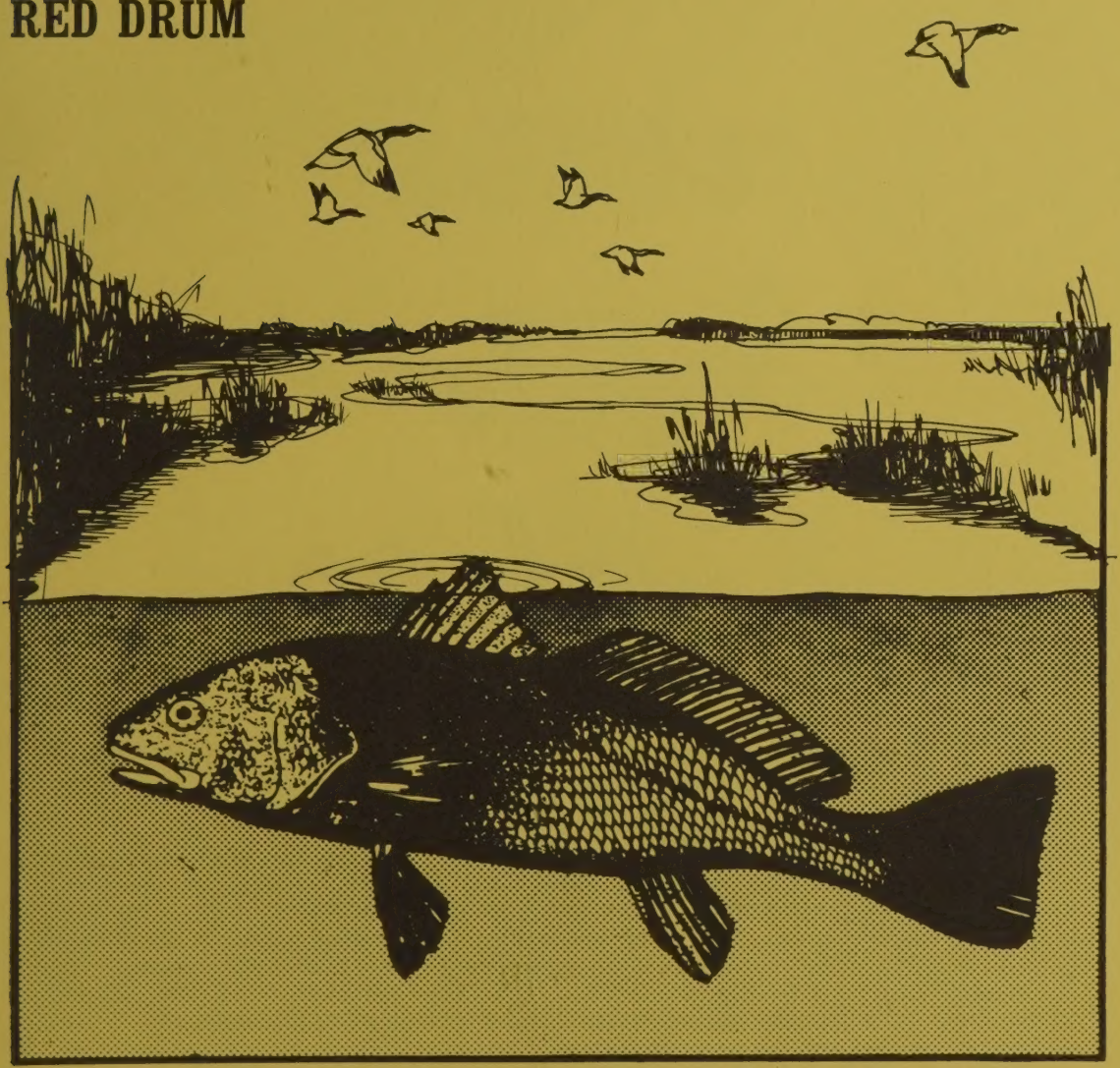
Biological Report 82 (11.36)
June 1985

TR EL-82-4

Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Gulf of Mexico)

RED DRUM



Fish and Wildlife Service
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This is one of the first reports to be published in the new "Biological Report" series. This technical report series, published by the Research and Development branch of the U.S. Fish and Wildlife Service, replaces the "FWS/OBS" series published from 1976 to September 1984. The Biological Report series is designed for the rapid publication of reports with an application orientation, and it continues the focus of the FWS/OBS series on resource management issues and fish and wildlife needs.

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Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Gulf of Mexico)

RED DRUM

by

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PREFACE

This species profile is one of a series on coastal aquatic organisms, principally fish, of sport, commercial, or ecological importance. The profiles are designed to provide coastal managers, engineers, and biologists with a brief comprehensive sketch of the biological characteristics and environmental requirements of the species and to describe how populations of the species may be expected to react to environmental changes caused by coastal development. Each profile has sections on taxonomy, life history, ecological role, environmental requirements, and economic importance, if applicable. A three-ring binder is used for this series so that new profiles can be added as they are prepared. This project is jointly planned and financed by the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service.

A habitat suitability index model of the red drum is under preparation (Buckley, in press).

Suggestions or questions regarding this report should be directed to one of the following addresses.

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CONVERSION TABLE

Metric to U.S. Customary

Multiply	By	To Obtain
millimeters (mm)	0.03937	inches
centimeters (cm)	0.3937	inches
meters (m)	3.281	feet
kilometers (km)	0.6214	miles
square meters (m^2)	10.76	square feet
square kilometers (km^2)	0.3861	square miles
hectares (ha)	2.471	acres
liters (l)	0.2642	gallons
cubic meters (m^3)	35.31	cubic feet
cubic meters	0.0008110	acre-feet
milligrams (mg)	0.00003527	ounces
grams (g)	0.03527	ounces
kilograms (kg)	2.205	pounds
metric tons (t)	2205.0	pounds
metric tons	1.102	short tons
kilocalories (kcal)	3.968	British thermal units
Celsius degrees	1.8(°C) + 32	Fahrenheit degrees

U.S. Customary to Metric

inches	25.40	millimeters
inches	2.54	centimeters
feet (ft)	0.3048	meters
fathoms	1.829	meters
miles (mi)	1.609	kilometers
nautical miles (nmi)	1.852	kilometers
square feet (ft^2)	0.0929	square meters
acres	0.4047	hectares
square miles (mi^2)	2.590	square kilometers
gallons (gal)	3.785	liters
cubic feet (ft^3)	0.02831	cubic meters
acre-feet	1233.0	cubic meters
ounces (oz)	28.35	grams
pounds (lb)	0.4536	kilograms
short tons (ton)	0.9072	metric tons
British thermal units (Btu)	0.2520	kilocalories
Fahrenheit degrees	0.5556(°F - 32)	Celsius degrees

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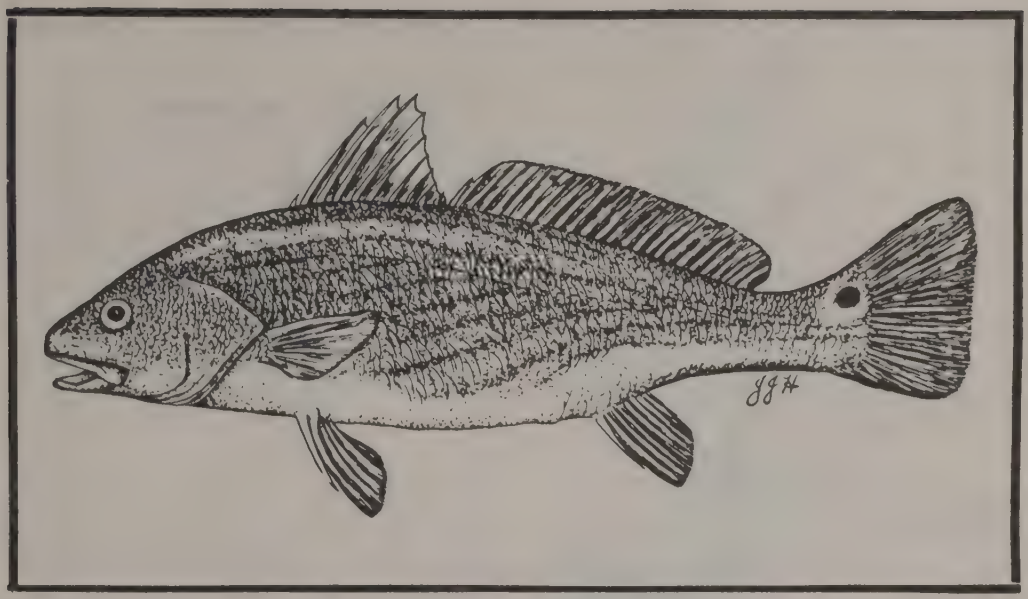

Figure 1. Red drum.

RED DRUM

NOMENCLATURE/TAXONOMY/RANGE

Scientific name ..... Sciaenops ocellatus (Linnaeus)
Preferred common name ..... Red drum (Figure 1)
Other common names ..... Redfish, channel bass (Hoese and Moore 1977)
Class ..... Osteichthyes
Order ..... Perciformes
Family ..... Sciaenidae

Geographic range: The red drum is distributed from the Gulf of Maine to Tuxpan, Mexico. It is rare north of New Jersey and most abundant in the coastal waters of eastern Florida and the Gulf States. Greatest concentrations are in Louisiana and Texas (Figure 2).

MORPHOLOGY/IDENTIFICATION AIDS

The red drum has 11 spines on the dorsal fin (the 11th is separate from the first 10), and 23-25 soft rays. The anal fin has two spines and 8-9 soft rays. The number of scales in the lateral line, which extends to the posterior margin of the caudal fin, ranges from 45 to 50. Gill rakers, rather short and slender, number 5-6 above and 7-8 below on the first gill arch (Hoese and Moore 1977).

General body color in young red drum is silvery; older fish become coppery brown or reddish. The species is characterized by one (sometimes more) large black spot near the base of the caudal fin above the lateral line (Hoese and Moore 1977).

Figure 2. Distribution and population concentrations of red drum in the northern Gulf of Mexico.

REASON FOR INCLUSION IN THE SERIES

The red drum is one of the most important sport and commercial coastal species in the Gulf of Mexico. Sport fishing is best during the spring and fall migration runs. Authorities in the Gulf States are concerned with the decline in the abundance of red drum. For example, Texas has closed its coastal waters to commercial fishing for red drum and other Gulf States are considering similar management.

LIFE HISTORY

Spawning

Red drum spawn in late summer and fall. During this period they migrate out of estuaries and lagoons and move into deeper water near the mouths of bays and inlets where they spawn (Pearson 1928; Simmons and Breuer 1962; Johnson 1978; Perret et al. 1980). Spawning also takes place on the gulf side of the barrier islands in the Mississippi Sound (Perret et al. 1980).

Most red drum in the Gulf of Mexico spawn from mid-August to December. On the west coast of Florida, spawning begins in September and peaks in October (Yokel 1966). Along the Alabama coast, red drum spawning begins in mid-August, peaks from mid-September through October, and continues through December (Perret et al. 1980). In Mississippi, red drum spawn from September to November.

The spawning behavior of the red drum in captivity was described by Guest and Lasswell (1978). Drumming sounds produced by mature males began near dusk. Males increased their drumming intensity as they swam close to females near the bottom of the tank. Each female that was ready to spawn was attended by several males that nudged the female's abdomen. One spawning episode took place when three males nudged a female upward and released milt as the female released her eggs. The drumming and nudging peaked between 2130 and 2140 hr.

Eggs

Red drum eggs are spherical and contain 1 (rarely up to 6) colorless oil droplets (Johnson et al. 1977). The chorion of the egg is clear and unsculptured; egg diameter ranges from 0.80 to 0.98 mm and the perivitelline space is usually less than 2% of egg diameter; oil droplet diameters range from 0.22 to 0.36 mm.

Laboratory studies by Holt et al. (1981) revealed that the optimum combination of temperature and salinity for hatching and larval survival was 25°C and 30 ppt. Higher temperatures and lower salinities usually decreased hatching success. Eggs floated at salinities of 25 ppt and higher, but sank when salinities dropped below 20 ppt (Holt et al. 1981). In a study in Mobile Bay (Marley 1983), red drum eggs were carried into bays by high salinity tidal currents. Such transport of eggs is unlikely during periods of high freshwater inflow.

Yolk-Sac Larvae

The yolk-sac larvae of red drum are 4-6 mm long total length (TL). (All lengths in this report are total lengths unless indicated otherwise). The dorsal and ventral fin folds are continuous with the well-developed caudal fin. The pectoral and pelvic fins are underdeveloped, and the dorsal and anal fin rays are indistinct. Large numbers of brown chromatophores are located along the base of the anal fin and smaller groups are at the base of the dorsal fins (Pearson 1928). Information on the ecology of red drum yolk-sac larvae is scarce.

Postlarvae

Postlarval red drum (7 mm long) retain a small portion of the ventral fin fold between the vent and anal fin. Chromatophores appear on the head and along the body. Red drum 10 mm long are heavily pigmented; when they reach 25 mm long, color patterns appear. The ground color of the postlarvae is silvery, and a row of five to seven brown blotches lies along the lateral line. Scales and teeth are present (Pearson 1928).

Postlarvae live among seagrasses and wetlands (Pearson 1928; Miles 1950; Bass and Avault 1975; Holt et al. 1983). In Louisiana, postlarvae were collected over hard sand and soft mud bottoms (Bass and Avault 1975). Postlarvae may live in open waters only during low tide and move back into cordgrass marsh at high tide. In Florida, postlarvae were most abundant along the edges of meadows of seagrass--particularly shoalgrass (Holt et al. 1983). Patchy seagrass meadows provide more edges for feeding and cover than do continuous meadows.

The survival of postlarvae about two weeks old was lowest at 20°C and highest at 25°C. Growth rates of postlarvae increased with increases in salinity (up to 30 ppt) and temperature (up to 25°C).

Juveniles

Juvenile red drum (15 to 300 mm long) tend to migrate from primary bays, which open to the sea, into secondary bays which open into primary bays. In October 1927, small juveniles (11 to 24 mm long) were abundant inside Aransas Pass, Texas, but the numbers decreased by mid-November (Pearson 1928). Small juveniles were more abundant in primary bays in October and in secondary bays in November (Miles 1950). In January, red drum (50 mm long) inhabited both primary and secondary bays (Miles 1950). When 85 to 100 mm long, they repopulated the deeper waters of the primary bays (Miles 1950).

Juvenile red drum in Texas inhabit the estuaries for 6 months or longer (Perret et al. 1980). In April of years when salinity was 40 to 50 ppt, schools of juveniles (100 to 150 mm long) concentrated in boat basins, quiet waters near spoil banks, and in shallow isolated marshlands (Simmons and Breuer 1962). In years when salinities were lower, juveniles were scattered among grassy areas in estuaries (Pearson 1928). Schools of juvenile red drum began to disperse in May; no concentrations were observed by June. The breakup of the schools coincided with a movement of some young fish into the Gulf of Mexico (Simmons and Breuer 1962). Juvenile and adult red drum also moved into the Gulf of Mexico or deeper waters in or near passes in winter (Yokel 1966).

Adults

Most red drum mature at lengths of 305 to 750 mm when they are 4 to 5 years old (Pearson 1928). Gunter (1950) caught one ripe fish 425 mm long. In the upper Laguna Madre, Texas, Miles (1950) reported ripe males 500 mm long and ripe females about 550 mm long. Red drum in Alabama were mature when 305 to 381 mm long, and in Mississippi, fish 320 mm to 395 mm long were mature (Perret et al. 1980).

In mariculture in Florida, individual female red drum have produced from 20,000 to 2 million eggs per spawn (Roberts et al. 1978). In Texas, red drum that spawned in tanks produced an average of 1.2 million eggs per spawn (Lasswell et al. 1977).

Adult red drum in the Gulf of Mexico tend to travel in schools close to shore until summer when some move into estuaries (Pearson 1928); however, some of the larger fish remain

in the open Gulf of Mexico year round (Simmons and Breuer 1962).

GROWTH CHARACTERISTICS

Red drum grow fast in early life. In Texas, red drum in culture reached 5.1 mm TL in their first 12 days of life (Johnson et al. 1977). In the lower Ocklockonee River, Florida, juvenile red drum were 71 mm standard length (SL) in March (Joseph and Yerger 1956), 109 mm in April, 147 mm in May, and 216 mm in June (Parrish 1968). In the Everglades National Park, Florida, they grew 20 mm (TL) per month during the fall and winter and were about 83 mm long by March (Roessler 1967).

Ages and growth rates of adult red drum have been estimated by scales, otoliths, length frequency, and tagging. Standard lengths (mm) of red drum in a marsh impoundment in South Carolina, as estimated by reading otoliths, were as follows: Age I, 365; II, 486; III, 610; IV, 690; V, 710; VI, 746; and VII, 710 (Theiling and Loyacano 1976).

In Texas, Pearson (1928) reported that the estimated average lengths of fish of ages I to III were as follows: Age I, 300; II, 530; and III, 630 mm (TL). Simmons and Breuer (1962) reported calculated growth of red drum from Texas for ages I to III as follows: I, 325; II, 540; and III, 760 mm. Growth was slow in spring, rapid through early and mid-summer, and slow at the end of summer. In Florida, the growth rates of red drum from 1961 to 1965 ranged from 0.04 to 0.66 mm per day (Table 1).

The following mean standard lengths in mm of red drum of different age groups from Mississippi waters were reported by Etzold and Christmas (1979): Age I, 340; II, 540; III, 640; IV, 750; and V, 840.

From a collection of 62 red drum (96 to 1012 mm long) caught in Chandeleur Sound in Louisiana and the Mississippi Sound in Mississippi, the following Von Bertalanffy growth equation was determined from age determination by otoliths (Rohr 1978):

Table 1. Lengths and growth of red drum tagged and recaptured after various intervals in Florida (Perret et al. 1980).

Length at tagging (mm)	Growth (mm)	Period of growth (days)	Growth per day (mm)	Source
282	121	182	0.66	Topp (1963)
310	248	429	0.58	Beaumariage and Wittich (1966)
333	130	289	0.45	Beaumariage (1964)
340	125	488	0.26	Beaumariage (1964)
350	175	497	0.35	Beaumariage (1964)
364	42	405	0.10	Beaumariage (1964)
373	115	186	0.62	Ingle et al. (1962)
391	8	210	0.04	Topp (1963)
420	105	429	0.24	Beaumariage and Wittich (1966)
438	37	420	0.09	Beaumariage (1964)
545	160	381	0.42	Beaumariage (1964)
655	20	243	0.08	Beaumariage and Wittich (1966)

$L = 950 \text{ mm } [1-2.72^{-0.37}(t + 0.30)]$
where L = total length and
t = growth interval in years.

The length-weight relations for red drum from Louisiana and Texas were similar (Table 2) except for the relation reported by Bass and Avault (1975), who examined smaller, faster growing fish.

The relation between total length and standard length for 8,982 red drum from Texas ranging from 67 to 185 mm (SL) was TL = 12.87 + 1.77 SL (Harrington et al. 1979). A similar relation for 47 red drum from Texas (253 to 411 mm SL) was TL = 25.19 + 1.13 SL (Luebke 1973).

THE FISHERY

The Commercial Fishery

In 1971-1981 commercial landings of red drum from the Florida gulf coast, Alabama, Mississippi, Louisiana, and Texas increased and peaked in 1973-1978, and generally decreased thereafter (Table 3). West Florida showed the least change from 1971 to 1976. The Texas landings declined sharply from 1975 to 1978; commercial fishing for red drum in Texas was banned in 1979. Alabama commercial landings peaked in 1973, declined until 1977, recovered somewhat in 1978 and 1979, and reached a low in 1981. Mississippi's commercial red drum catch peaked in 1978, decreased in 1980, but increased in 1981.

Louisiana's commercial landings of red drum, usually the highest of the Gulf States, increased gradually to a peak of 2 million lb in 1976 and then decreased to a low of 0.7 million lb in 1980.

The gear used to catch red drum varies by state, but includes gill nets, trammel nets, haul seines, hand lines, troll lines, longlines, and otter trawls (Table 4). The trammel net was the most common gear used in 1974. Longlines were used primarily in Texas.

Red drum are fished commercially in the Gulf of Mexico year round, but most landings are made in September to February. No Gulf of Mexico State has a production limit. The minimum legal total lengths in 1982 were Florida, 12 inches; Mississippi, 14.3 inches; Louisiana, 16 inches, Alabama, no limit; and Texas had no commercial fishing (Louisiana Department of Wildlife and Fisheries 1983).

Because of decreasing catches, the red drum commercial and sport fisheries in the Gulf States are undergoing evaluation within the context of resource planning and management.

Sport Fishery

Red drum furnish one of the largest sport fisheries along the Gulf of Mexico coast. The estimated sport catches of red drum for 1974 and 1975 (Table 5) showed that Louisiana had the largest catch (26.4 million lb), and Texas the second largest (15.1 million lb). Gulf State sport catches by season are shown in Table 6.

In Vermilion Bay, Louisiana, the catches of red drum were largest in October in 1977 (Juneau and Pollard 1981). In 1978, the catch was highest in March, April, and May and in August and September. In 1979, highest monthly catches were in August and September. A comparison of the sport catch of red drum with the number of licenses sold in 1964, 1965, 1970, and 1975 in Louisiana shows that the catch increased 98% whereas license sales increased by only 46% (Table 7).

In Alabama, Wade (1977) evaluated the catches of red drum offshore, inshore, from a pier, and from shore. The catch was higher in the inshore than in the offshore fishery but the best fishing was at a pier on Dauphin

Table 2. Length-weight relationships of red drum from Louisiana and Texas.

State	Life Stage	Number of fish	Range in standard lengths (mm)	Length-weight relationship (SL)	Source
Louisiana	Adult	286	240-940	log W(g), = -4.4216+(2.83284) log (mm) SL	Boothby and Avault (1971)
Texas	Adult	47	283-411	log W(g) = -4.69 + (2.97) log (mm) SL	Luebke (1973)
Louisiana	Juvenile	568	8-183	log W(g) = 7.2052 + (4.1913) log (mm) SL	Bass and Avault (1975)
South Carolina	Adult	54	100-300	log W(g) = -1.29596 + (2.74031) log (mm) SL	Theiling and Loyacano (1976)
Texas	Juvenile +	8319	71-970	log (W)g = -5.085 + (3.04) log (mm) SL	Harrington et al. (1979)

Table 3. Commercial landings (thousands of pounds) and value (thousands of dollars) of red drum from five Southern States (Louisiana Department of Wildlife and Fisheries 1983).

	Florida[a]		Texas[b]		Alabama		Mississippi		Louisiana	
Year	Weight	Value	Weight	Value	Weight	Value	Weight	Value	Weight	Value
1971	708	122	1,991	484	32	4	59	7	724	137
1972	843	152	1,468	409	77	9	56	7	889	157
1973	954	193	1,677	539	172	23	86	12	1,183	229
1974	1,191	259	1,921	614	120	16	89	12	1,436	296
1975	759	181	2,120	795	74	10	71	11	1,362	330
1976	905	233	2,029	888	67	9	95	17	2,212	600
1977			951	512	65	9	164	30	1,435	497
1978			865	596	86	17	658	181	1,219	533
1979					85	22	194	90	1,057	563
1980					53	14	20	7	725	423
1981					38	13	67	16	899	647

[a]Florida values are for the gulf coast only. No data for Florida in 1977-81.
[b]Texas closed commercial fishing for red drum in 1979.

Table 4. Gulf of Mexico commercial catch of red drum (thousands of pounds) in 1974 by type of gear and State (National Marine Fisheries Service Computer Data Base, Southeast Fisheries Center, Miami, FL).

Gear Type	FL	AL	MS	LA	TX	Total	Percent
Trammel net	116	44	2	892	387	1441	30.3
Longline	--	--	--	2	1349	1351	28.4
Runaround gillnet	708	9	64	264	--	1045	22.0
Haul seine	225	--	--	30	140	395	8.3
Staked gillnet	--	--	--	178	37	215	4.5
Hand line	140	1	2	60	6	209	4.4
Shrimp trawl	--	66	9	10	2	86	1.8
Fish trawl	--	--	12	--	--	12	< 1
Troll line	2	--	--	--	--	3	< 1

Table 5. Estimated average annual sport catch of red drum in Gulf of Mexico States for 1974 and 1975 (National Marine Fisheries Service Computer Data Base, Southeast Fisheries Center, Miami, FL).

State	Thousands of pounds
Alabama	870
Florida	5,112
Mississippi	1,443
Louisiana	26,369
Texas	15,135

Table 6. Mean weight (lb) of red drum taken by sport fishermen in 1979 from States along the Gulf of Mexico during winter (December-February), spring (March-May), summer (June-August), and fall (September-November); from Perret et al. (1980).

	Season				
State	Winter	Spring	Summer	Fall	Mean
AL	2.88	22.50	5.50	7.43	9.58
FL	4.56	4.26	5.10	5.07	4.75
MS	1.00	11.10	2.00	1.67	3.94
LA	2.71	2.05	1.67	2.58	2.25
TX	1.33	2.33	2.00	2.40	2.02
All	2.50	8.45	3.25	3.83	4.51

Table 7. Louisiana sport catch of red drum and average catch per license sold in selected years (Adkins et al. 1979).

Years	Thousands of pounds	Thousands of licenses	Average catch per license (lb)
1964	342	80	4
1965	1,425	88	16
1970	9,926	129	77
1975	26,369	150	176

Island, Alabama. The largest shore catches were from Mobile Bay and Dauphin Island. The largest number of red drum usually were caught by fishermen in private boats.

The peak sport catch of red drum in Biloxi Bay, Mississippi, and Mississippi Sound was in September and December (Jackson 1972). Throughout the year of 1970, the red drum catch was only 1.2% of the total sport fish catch.

ECOLOGICAL ROLE

Red drum are major predators in estuaries but their role as prey has not been documented. In Louisiana the

dominant foods by frequency of occurrence in 568 juvenile red drum (10 to 183 mm long TL) studied by Bass and Avault (1975) were as follows: <10 mm, Copepoda (100%); 10-49 mm, Mysidacea (18 to 67%); 50-69 mm, fish (31 to 57%); 70-99 mm, Decapoda (22-60%); 100-109 mm, Mysidacea (38%); 110-119 mm, Decapoda (66%); 120-149 mm, fish (52%); 150-159 mm, Decapoda (63%); 160-169 mm, fish (29%); and 170-179 mm, Decapoda (33%). In Texas, Miles (1950) reported that the major food item of 130 juvenile red drum (40 to 127 mm TL) consisted of unidentified shrimp (39.2%); Palaemonetes sp. (11.5%); Penaeidae (10.1%); unidentified fish (11.6%); and unidentified crabs (7.7%).

An earlier food study (Pearson 1928) of 236 juvenile red drum (10 to 68 mm) in Texas by size groups showed the following percentages of food by volume: 6-16 mm--52% shrimp, 20% fish, 6% crabs; 17-30 mm--83% shrimp, 2% fish, 10% crabs; 31-46 mm--79% shrimp, 2% crabs; and 47-68 mm--48% fish, and 50% crabs.

Juvenile red drum feed night and day (Bass and Avault 1975). Small juveniles (20 to 30 mm long) fed during the day and night but ate a greater variety of organisms during the day. Larger juveniles (65 to 85 mm long) predominantly fed on grass shrimp (Palaemonetes pugio) during the day, whereas spot (Leiostomus xanthurus) was the major food at night.

Juvenile red drum (15 to 50 mm long) selected mysids, even after mysid abundance declined 41% (Bass and Avault 1975). When mysids declined from 72% to 4% of the organisms in bottom samples, the fish fed on other organisms.

Adult red drum feed primarily on fish, shrimp, and crabs (Table 8). Fish, primarily menhaden (Brevoortia) and anchovies (Anchoa), are most important in the winter and spring, while crabs and shrimp are important in the summer and fall (Boothby and Avault 1971).

In Mississippi, the percent frequencies of occurrence of different foods of red drum (190 to 780 mm SL) were as follows: penaeid shrimp, 40.4; callinectid crabs, 54.8; and fish, 43.3 (Overstreet and Heard 1978). The percent occurrence of food items by season was: Penaeids (53.3%) in winter; Callinectes sp. (70.6%) in spring; Callinectes sp. (65.4%) in summer; and fish (50.0%) in fall. Shrimp, crabs, and fish also made up the major foods of 1,197 red drum from Texas (Simmons and Breuer 1962).

Table 8. Seasonal food habits of 349 adult red drum (250-932 mm long) in Louisiana (Boothby and Avault 1971).

	Frequency of occurrence (%)		Volume (%)		Major food and percent (in parentheses) of total volume	
Season	Fish	Crustacea	Fish	Crustacea	Fish	Crustacea
Winter	81	50	55	39	Menhaden (16)	Bluecrab (23)
Spring	83	55	54	38	Anchovy (10)	Bluecrab (20)
Summer	86	89	34	59	Inshore lizard[a]	Penaeid shrimp (22)
Fall	65	81	28	65	Anchovy (4)	Penaeid shrimp (32)

[a]Synodus foeteus.

ENVIRONMENTAL REQUIREMENTS

Temperature and Salinity

Migration, spawning, and growth of red drum are affected by water temperature and salinity. Juvenile red drum movement out of the estuaries appears to be triggered by the decrease in fall temperatures. When bays and inlets warm in spring, the fish migrate from the Gulf of Mexico into the bays. Red drum tolerate a wide temperature range (2° to 37.5° C) (Table 9), but sudden freezes cause mass mortalities (Gunter 1941; Gunter and Hildebrand 1951). A temperature-salinity graph showing relative abundance of small (120 mm TL) red drum on the Mississippi coast had a major peak at 25°C and 35 ppt and a smaller peak at 25°C and 30 ppt (Loman 1978). From laboratory studies, Holt et al. (1981) found the best conditions for hatching and 24-h survival of larval red drum were 25°C and 30 ppt. Temperature was a substantial factor in 2 week survival of larvae, and growth of larvae was faster at 25° to 30°C than at 20°C.

Red drum have been collected at salinities of 0.14 to 50.0 ppt (Table 10). They have been successfully acclimated to freshwater (Lasswell et al. 1977). In years when salinities were as high as 40 to 50 ppt, juveniles were found only in small sloughs and boat slips; in years of lower salinities, the juveniles were scattered over grassy flats along the Texas coast. Red drum eggs floated in

Table 9. Locations and water temperatures at which red drum have been collected by various investigators.

State	Total lengths (mm)	Temperature (°C)	Source
Louisiana	15 - 375	5.0 - 37.5	Perret (1971)
Louisiana	220 - 350	15.3 - 30.5	Barrett et al. (1978)
Louisiana	352 - 712	14.3 - 30.7	Juneau (1975)
Louisiana	60 - 430	15.0 - 34.9	Tarver & Savoie (1976)
Florida	-- --	16.1 - 26.7	Roessler (1970)
Florida	70 - 120	21	Tabb and Manning (1961)
Texas	-- --	2-33	Simmons & Breuer (1962)

Table 10. Locations and salinities at which red drum have been collected by various investigators.

State	Total lengths (mm)	Salinity (ppt)	Source
Florida	70 - 120	5	Tabb and Manning (1961)
Florida	-- --	18.3 - 33.6	Roessler (1970)
Florida	21 - 132	0.14 - 0.4	Gunter and Hall (1962)
Texas	-- --	40.0 - 50.0	Simmons and Breuer (1962)
Louisiana	60 - 430	0.3 - 9.9	Tarver and Savoie (1976)
Louisiana	352 - 712	4.3 - 5.5	Juneau (1975)
Louisiana	15 - 375	5.0 - 29.9	Perret (1971)
Louisiana	220 - 350	17.2	Barrett et al. (1978)

salinities near 25 ppt and greater, but sank in lower salinities (Holt et al. 1981). This factor may influence egg survival, since eggs that sink to the bottom may become covered with silt and die.

Dissolved Oxygen

There is little information on the oxygen requirements of red drum; however, low oxygen in lower Laguna Madre, Texas, is known to have caused a fish kill that included red drum (Miles 1950).

Substrate

Small red drum (5-7 mm) that are carried into primary bays from the Gulf of Mexico move into seagrass areas, e.g., common widgeonweed (Pearson 1928; Simmons and Breuer 1962; Miles 1950). The primary factor in influencing the abundance of small (6 to 27 mm) red drum in seagrass meadows in Florida was the edge effect. More red drum were found at the edges of seagrass meadows than in the seagrass meadows themselves. Seagrass provides habitat for food, and protection from predators. In Louisiana estuaries, however, post-larval and juvenile red drum are collected at low tide over sand and mud bottoms (Bass and Avault 1975). At high tide they moved into small cordgrass wetlands.

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16. Abstract (Limit: 200 words)

Species profiles are literature summaries of the taxonomy, morphology, distribution, life history, and environmental requirements of coastal aquatic species. They are prepared to assist in environmental impact assessment. The red drum (Sciaenops ocellatus) is an estuarine dependent species. It spends its entire life in estuaries or nearshore coastal waters of the Gulf of Mexico. Red drum spawn from mid-August to November; peak spawning is from mid-September through October. Larvae and juveniles remain in estuaries and adults live along the coast and in passes. Commercial landings in Louisiana (1971-81) ranged from 723,700 to 2,212,500 lb. Texas closed commercial fishing in 1979. In most Gulf States, the sport catch usually exceeds commercial landings. There are few data on population dynamics of the species. Larval and juvenile red drum eat primarily invertebrates; adults feed on fish, shrimp, and crabs. Red drum tolerate a wide range of temperatures (2° to 37.5 °C) and salinities (0.14 to 50 ppt).

17. Document Analysis a. Descriptors

Estuaries
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Sciaenops ocellatus
Temperature requirements
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Spawning

c. COSATI Field/Group

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